

What is claimed is:

1. A method for determining an endpoint of a cleaning process running in a chamber that comprises steps of:

directing radiation absorbed by a byproduct of the cleaning process into
5 an exhaust line of the chamber;

detecting a measure of absorbance of the radiation by the byproduct;
and

determining the endpoint when the measure of absorbance falls within a
predetermined window.

10 2. The method of claim 1 wherein the predetermined window corresponds to 100% cleaning of the chamber and less than 100% cleaning of a predetermined portion of the exhaust line.

3. The method of claim 2 wherein the cleaning process is a dark cleaning process and the step of directing comprises directing infrared radiation.

15 4. The method of claim 3 wherein the step of detecting comprises detecting further radiation emitted by the byproduct after absorbing the radiation.

5. The method of claim 4 wherein the step of detecting further comprises analyzing the further radiation using Fourier Transform Raman spectrometry.

20 6. The method of claim 5 wherein the step of detecting further comprises generating an output signal representative of the measure.

7. The method of claim 6 wherein the step of determining comprises determining the endpoint when the output signal falls within the predetermined window.

25 8. The method of claim 6 wherein a second output signal is a predetermined multiple of the output signal.

9. The method of claim 7 wherein the step of determining the endpoint when the output signal falls within the predetermined window comprises determining when the output signal falls below a predetermined level.

30 10. The method of claim 9 wherein the byproduct is SiF_4 .

11. An apparatus for determining an endpoint of a cleaning process running in a chamber that comprises:

a radiation source that transmits radiation absorbed by a byproduct of the cleaning process into an exhaust line of the chamber;

5 a detector that detects further radiation emitted by the byproduct and a measure of background radiation;

an analyzer that analyzes the further radiation and the measure to determine a measure of absorbance of the radiation by the byproduct; and

10 controller that generates an endpoint signal when the measure of absorbance reaches a predetermined window.

12. The apparatus of claim 11 wherein the predetermined window corresponds to 100% cleaning of the chamber and less than 100% cleaning of a predetermined portion of the exhaust line.

13. The apparatus of claim 12 wherein the cleaning process is a dark
15 cleaning process and the radiation source comprises a source of infrared radiation.

14. The apparatus of claim 13 wherein the detector comprises a filter that transmits the further radiation and a filter that transmits radiation in a band of wavelengths close to wavelengths of the further radiation.

15. The apparatus of claim 14 wherein the analyzer comprises a
20 Fourier Transform Raman spectrometer.

16. The apparatus of claim 15 wherein the analyzer generates an output signal representative of the measure.

17. The apparatus of claim 16 wherein the controller generates the endpoint signal when the output signal falls within the predetermined window.

25 18. The apparatus of claim 17 wherein the controller generates the endpoint signal when the output signal falls below a predetermined level.

19. The apparatus of claim 18 wherein byproduct is SiF_4 .